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FOREST INSECT CONDITIONS

NORTHERN REGION

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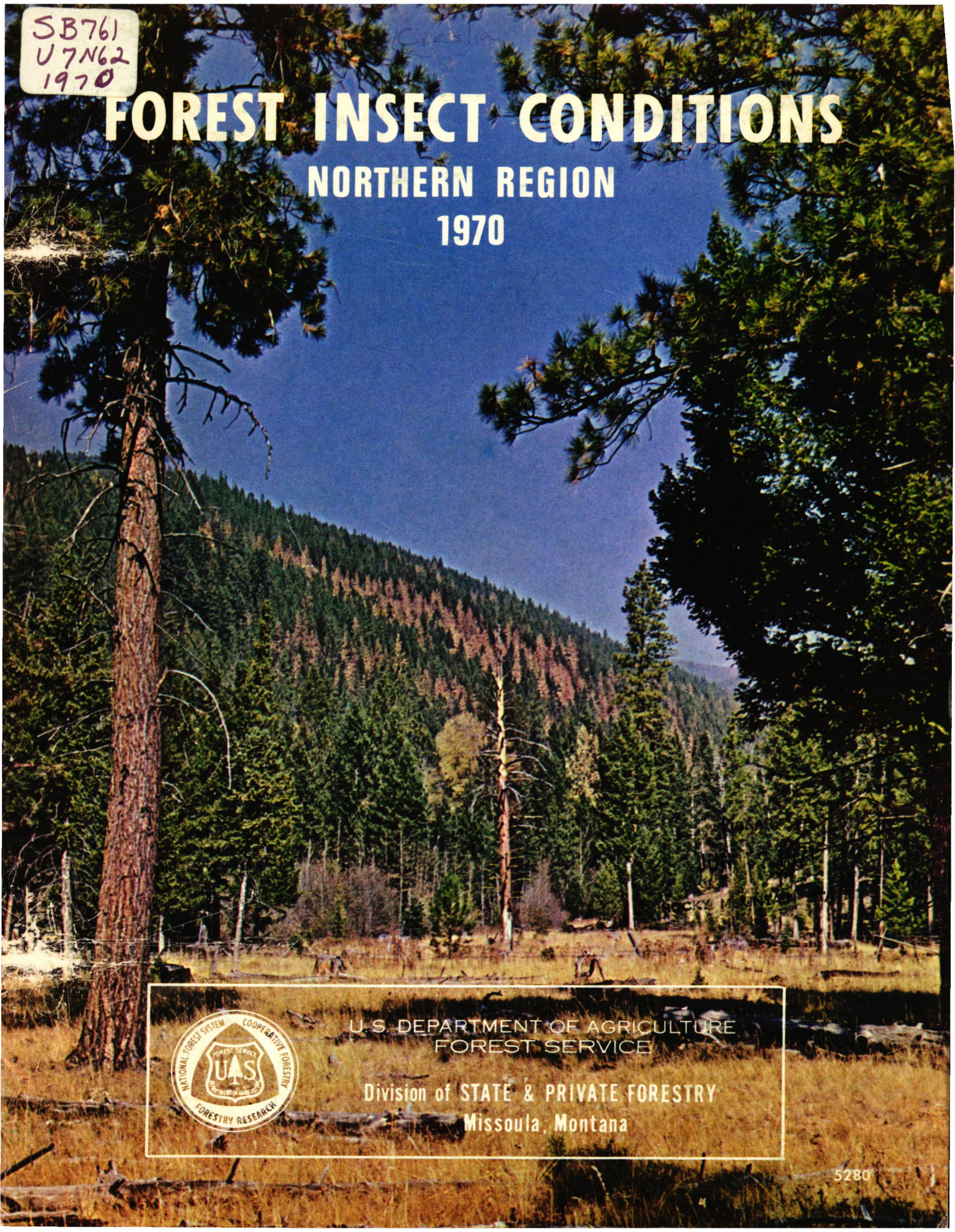

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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Missoula, Montana

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COVER PHOTO: Mountain pine beetle infestation in ponderosa pine, Helena National Forest, Montana

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FOREST INSECT CONDITIONS IN THE NORTHERN REGION - 1970 1/

By

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INTRODUCTION

Forest lands of the Northern Region are plagued by a vast complex of destructive insects which cause tree mortality, deformity, growth loss, dieback, and reduced seed crops. Insects not only reduce the potential productivity of forested acreages but also destroy scenic, recreational and watershed values. Entomologists of the Forest Service's Northern Region annually conduct aerial and ground detection surveys designed to discover incipient populations of destructive insects. Once detected, infestations are evaluated to measure the severity, the potential for damage by future generations and the need for control. The surveys help keep resource managers abreast of destructive insect populations so that necessary insect suppression measures may be initiated when infestations are small. This results in minimal losses to the forest resource, lower suppression costs and an environment of greater quality for all of mankind.

A number of insect surveys and evaluations were conducted in the Northern Region during 1970. They include:

1. Systematic aerial and ground surveys to discover and measure the extent of damage caused by epidemic insect populations.

2. Surveys to forecast population trends of defoliating insects.

3. Surveys to measure the spread of the larch casebearer and the impact native and introduced parasites have on the casebearer.

4. Evaluations to measure the status and trend of bark beetle infestations.

5. Systematic surveys of insects affecting seed production of commercially important tree species in the Northern Region.

1/ Includes forested lands in Montana, northwestern South Dakota, North Dakota, northern Idaho, northeastern Washington, and National Park Service land in northwestern Wyoming.

6. Evaluation of insects of lesser importance (terminal weevils, shoot and stem infesting insects, etc.) to estimate damage levels.

This report describes, in brief, the results of these surveys and summarizes the status of destructive forest insect populations in the Northern Rocky Mountains during 1970.

CONDITIONS IN BRIEF

The western budworm caused varying degrees of defoliation on approximately 4 million acres of Douglas-fir and mixed conifer type. Budworm infestations continue to decline in Douglas-fir forests east of the Continental Divide and intensified in the mixed coniferous forests of western Montana and northern Idaho. The larch casebearer continued its spread and invaded new areas in western Montana. Intensity of infestations remained relatively low levels in Montana, except in the vicinity of Flathead Lake. Mountain pine beetle infestations continue in western white pine forests on the Kaniksu and Flathead National Forests and increased considerably in ponderosa and lodgepole pine stands on the Lolo, Helena, and Gallatin National Forests in Montana and in lodgepole pine in Yellowstone National Park, Wyoming. Tree killing by the spruce beetle and Douglas-fir beetle remained at low levels during 1970. Fir engraver beetle populations continue to decline over most of the Region, but localized infestations continue in several areas. A pine looper caused severe defoliation of ponderosa pine near Lame Deer and Ashland, Montana, for the second consecutive year, but heavy parasitism and disease infection of mature larvae caused the outbreak to collapse. Ips engraver beetles infested and killed many of the severely defoliated pines.

MAJOR DEFOLIATOR PROBLEMS

WESTERN SPRUCE BUDWORM, Choristoneura occidentalis Free.

Although infestation boundaries have changed somewhat, total budworm defoliation remains around the 4-million-acre mark of 1969. Budworm activity continues to be light on the forests east of the Continental Divide with the exception of an area of moderate to heavy defoliation on the Deerlodge National Forest, Montana. Greatest decline of budworm activity was on the Bitterroot National Forest, Montana. Size of this infestation was not greatly reduced but intensity of defoliation decreased considerably. Infestations remain static at a high level of activity with over a million acres defoliated on the Nezperce National Forest, Idaho. Increased tree mortality was noted in 1970, especially along the South Fork of the Clearwater River. Nearly all fir and spruce stands on the Nezperce National Forest are infested. Infestations have gained in size and intensity on the Lolo National Forest, Montana, and the Clearwater and St. Joe National Forests, Idaho. The infestation on the St. Joe National Forest was first visible on 2,000 acres in 1968. It spread to 15,500 acres in 1969 and to 28,000 acres in 1970 (Fig. 1).

Figure 1 - Aerially visible defoliation by western spruce budworm in Montana and Northern Idaho - 1971

The trend for the Region is following the pattern of the past 4 years. Defoliation is decreasing in pure Douglas-fir stands of eastern Montana and increasing in high-value mixed conifer stands of western Montana and northern Idaho.

LARCH CASEBEARER, Coleophora laricella (Hbn.)

Heaviest larch casebearer defoliation in 1970 occurred at lower elevations of the Colville National Forest in Washington, and the Kaniksu, Coeur d'Alene, St. Joe and Clearwater National Forests in Idaho. The forefront of the infestation expanded into the North and Middle Fork of the Flathead River and Blackfoot River in Montana during 1970. The only western larch stands in the Northern Region that remain free of casebearer infestation are in the Bob Marshall Wilderness and the headwaters of the Blackfoot and North Fork Flathead Rivers (Fig. 2). Casebearer populations are at relatively low levels throughout Montana with the exception of the Flathead Lake area and along the Idaho border. Tree mortality and branch dieback have not been observed in new areas of infestation.

The introduced parasite Agathis pumila (Ratz.) was recovered from 33 of 56 release sites sampled in 1970. Parasitism by A. pumila averaged 63 percent from one of the original 1960 release sites but was less than 10 percent in 25 of the 33 areas where A. pumila was recovered. Two species of native parasites Dicladocerus sp. near westwoodi and Spilochalcis albifrons (Walsh) were common throughout the Region, accounting for an average of 11.2 and 4.1 percent parasitism of casebearer population respectively.

Casebearer populations are expected to increase significantly on the St. Joe National Forest, and remain high over other portions of north central Idaho in 1971. Infestation levels are expected to remain at fairly low levels in Montana, except for the Flathead Valley area.

PINE LOOPER, Phaeoura mexicanaria (Grote)

Defoliation of ponderosa pine by a pine looper, on the Northern Cheyenne Indian Reservation and the Ashland District, Custer National Forest in eastern Montana, occurred for the second consecutive year. The infestation spread from about 25,000 acres in 1969 to about 62,000 acres in 1970. Defoliation varied from light to complete stripping of the foliage (Fig. 3). Trees of all size and age classes were defoliated with equal intensity.

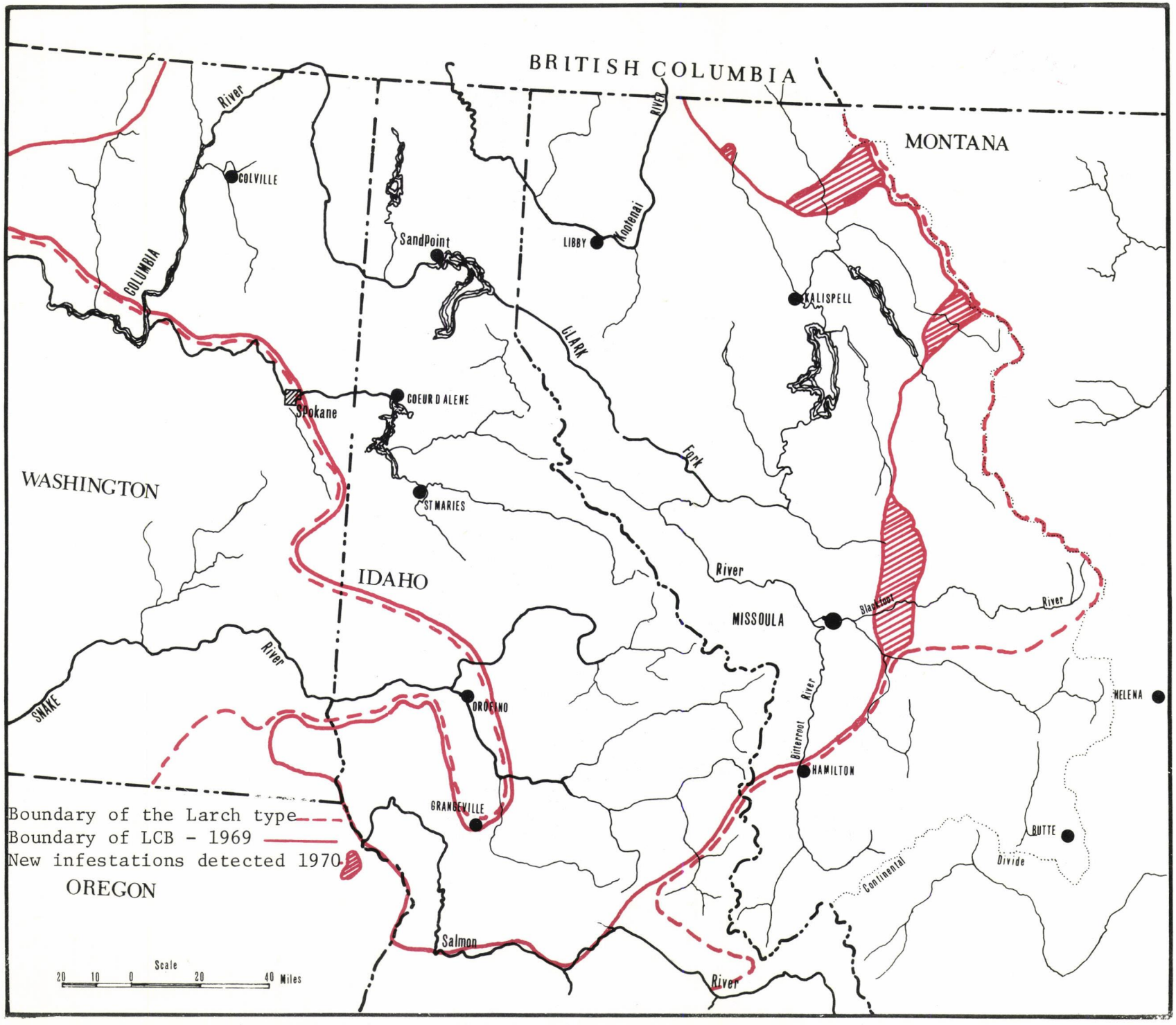

Fig. 2 - Spread of the larch casebearer in 1970.

Figure 3 - Ponderosa pine defoliated by pine looper in southeastern Montana.

Heavy looper mortality began to occur in late summer from feeding competition, parasites, and a bacterial disease (Fig. 4). No live looper pupae were located during the fall, indicating the infestation had collapsed.

The epidemic was short lived (2 years) and no tree mortality can be directly attributed to defoliation. However, defoliation was severe enough to predispose many trees to attack by Ips engraver beetles. These beetles killed thousands of defoliated pines.

PINE BUTTERFLY, Neophasia menapia Feld.

Pine butterfly activity increased in ponderosa pine stands on the Bitterroot and Lolo National Forests, Montana, during 1970. Defoliation could be observed from the ground for the first time. Egg surveys revealed sufficient eggs for a potential increase in 1971.

DOUGLAS-FIR TUSSOCK MOTH, Hemerocampa pseudotsugata Mcd.

Tussock moth activity has been at a low level in the Region during the last 5 years. Several isolated ornamental spruce in Spokane, Washington, and Polson and Missoula, Montana, were defoliated during 1970. This may be the first indication of renewed activity by this pest.

Figure 4.
Pine Looper larva killed by a bacterial disease.

DEFOLIATOR COMPLEX

The sugar pine tortrix, Choristoneura lambertiana (Busck); pine needle sheath miner, Zelleria haimbachi Busck; pine needle scale, Phenacaspia pinifoliae (Fitch); and an unidentified needle miner caused heavy defoliation of lodgepole pine on approximately 3,000 acres on the east side of Teakettle Mountain near Columbia Falls, Montana, on the Flathead National Forest, extending northeast to McDonald Lake in Glacier National Park. The sugar pine tortrix heavily defoliated ponderosa pine on State and private lands in Three Mile Creek adjoining the Helena National Forest, Montana. The tortrix and the pine needle sheath miner confine their feeding to current year's growth, and the unidentified needle miner mined only 1969 and older foliage. Scale populations were distributed throughout the infested area, but appeared heavier on the east side of Teakettle Mountain.

Heavy defoliation is anticipated in 1971.

MAJOR BARK BEETLE PROBLEMS

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae* Hopk.

Infestations continue in western white pine stands in Lightning Creek, Kaniksu National Forest, Idaho. Infested trees are being removed by commercial sale. Additional infestations occur in western white pine forests in the Upper Priest River on the Kaniksu National Forest, and along the South Fork of the Flathead River and around Hungry Horse Reservoir, Flathead National Forest, Montana.

A massive infestation of mountain pine beetle was detected in ponderosa pine stands in Ninemile Creek, Lolo National Forest near Missoula and on adjoining State and private lands. Approximately 30,000 acres are infested at a level of 16.1 trees per acre. Most infestations occur in overstocked second growth stands, 65 years of age, which contain more than 200 trees per acre. Commercial and precommercial thinning operations are planned for 1971 to reduce the mountain pine beetle infestation.

Mountain pine beetle and pine engraver beetle infestations in lodgepole pine stands increased in intensity on the Lolo National Forest and on adjoining State and private lands near St. Regis, Montana. The infestation spread over a gross area of 12,000 acres in spite of intensive removal of infested trees by commercial sale and piling and burning. Approximately 7,000 acres of National Forest land are infested at a level of 1.9 trees per acre.

Approximately 1,400 mountain pine beetle infested ponderosa pines were felled and burned in Lincoln Gulch on the Helena National Forest near Lincoln, Montana, during early 1970. Additional infestations were detected later in the year in Lincoln Gulch and nearby Park, Stonewall, and Liverpool Creek drainages (Fig. 5). An estimated 2,500 trees were infested by mountain pine beetle in this area. Control operations were initiated in these drainages during the latter part of 1970. By January 1971, a total of 80 million board feet of infested sawtimber had been salvaged and 1,600 unmerchantable trees cut, hand piled and burned.

Epidemic mountain pine beetle populations occur in lodgepole pine stands in the West Gallatin drainage, Gallatin National Forest, Montana. Perimeter infestations extend from lodgepole pine stands in the southwest portion of Yellowstone National Park to the northeastern portion of Bechler Basin. Several large groups of dead trees, detected in lodgepole pine stands on the west slopes of the Continental Divide in Glacier National Park, were attributed to the mountain pine beetle.

The mountain pine beetle caused localized group tree killing of ponderosa pine on the Flathead Indian Reservation and the Bitterroot and Lewis and Clark National Forests, Montana. Infestations in the vicinity of Monarch Mountain, on the Lewis & Clark National Forest, Montana, have declined to endemic levels.

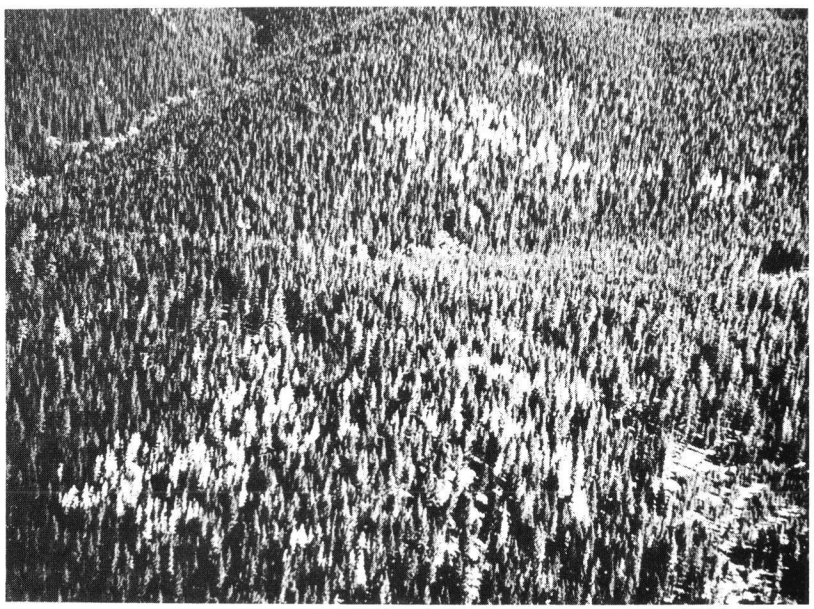

Figure 5. Mountain pine beetle infestations, Helena National Forest.

ENGELMANN SPRUCE BEETLE, Dendroctonus rufipennis (Kirby)

Tree killing by the Engelmann spruce beetle is at a very low level throughout the Region. Infestations declined to endemic levels as a result of unusually low temperatures during the winter of 1968-1969. A small outbreak developed in decked logs near a helispot construction site on the Colville National Forest. Infested logs will probably be burned in early 1971.

Salvage logging of spruce beetle killed trees is continuing in areas on the Flathead and Kootenai National Forests, Montana, and the Kaniksu National Forest, Idaho.

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae Hopk.

Localized tree killing by Douglas-fir beetle occurred in 1970. Logging slash was infested during 1970 in Tyler Creek east of Missoula on the Lolo National Forest, Montana. Groups of 1970 attacked trees, containing active populations, extend throughout the Tyler Creek-Gold Mountain area. Salvage logging is planned to remove the dead trees.

IPS ENGRAVER BEETLES, Ips sp.

The pine engraver, Ips pini (Say), killed ponderosa pines in groups of up to 50 trees along the South Fork Clearwater River on the Nezperce National Forest, Idaho. An increase in pine engraver activity was detected in ponderosa and lodgepole pine stands near Hayden Lake, Coeur d'Alene National Forest, Idaho. Infestations showed a downward trend in ponderosa pine forests along the Clark Fork River west of Missoula, where losses have occurred for several years. Localized pine engraver activity occurred in the Sleeping Child drainage, Bitterroot National Forest, Montana, and in the Blacktail Mountains of the Flathead Indian Reservation. I. pini was commonly associated with mountain pine beetle infestations in western Montana. Infested lodgepole pines near St. Regis, Montana, contained higher brood densities of I. pini than D. ponderosae.

The six-spined engraver, Ips calligraphus (Germ.) caused severe losses in ponderosa pine stands which suffered heavy defoliation by the pine looper, Phaeoura mexicanaria (Grote), on the Ashland District, Custer National Forest, and the Northern Cheyenne Indian Reservation near Lame Deer, Montana. Infestation levels of 72 trees per acre were recorded on Cook Mountain on the Ashland District (Fig. 6).

Figure 6. Galleries of Ips calligraphus in ponderosa pine defoliated by pine looper.

FIR ENGRAVER, Scolytus ventralis Lec.

Prolonged periods of drought during 1966 and 1967 triggered outbreaks of this beetle throughout grand fir type of northern Idaho. Tree killing declined during 1970, but some localized activity continued. Aerial surveys in 1970 revealed infestations west of the Salmon River and in the Meadow Creek drainages, Nezperce National Forest, Idaho, and near Powell, Idaho. Scattered infestations occurred on the Coeur d'Alene National Forest, Idaho, and west of Plains, Montana. No control operations are planned, but salvage logging is underway.

OTHER MAJOR INSECT PROBLEMS

ENGELMANN SPRUCE WEEVIL, Pissodes engelmanni Hopk.

Engelmann spruce weevil top killed spruce reproduction throughout spruce forests in Montana, Idaho, and in Yellowstone National Park (Fig. 7).

Heaviest top killing occurred in a young plantation in Emery Creek, on the Hungry Horse District of the Flathead National Forest. Repeated attacks resulted in complete mortality of 50 sapling size spruce in this plantation since 1967. Damage is expected to continue.

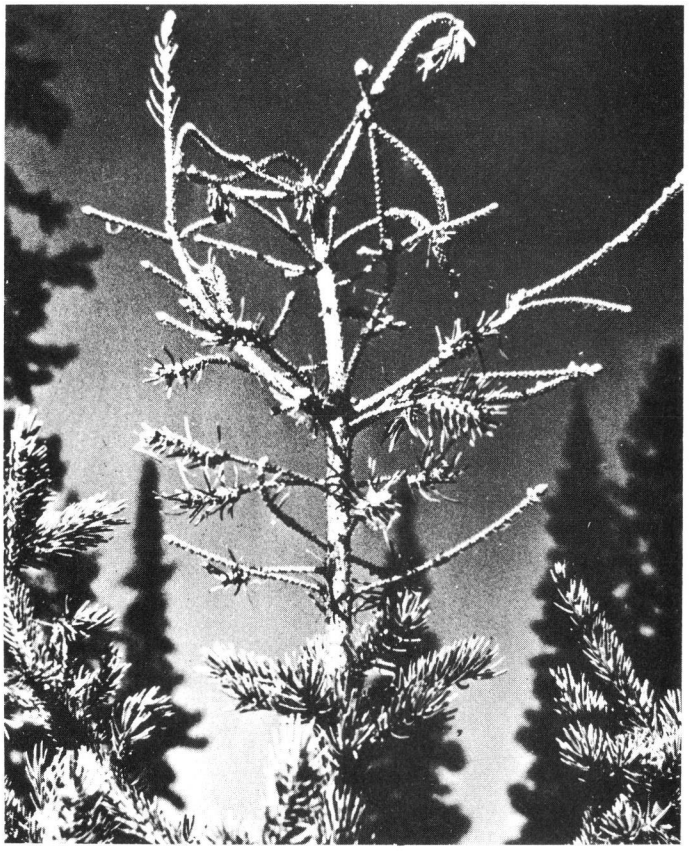

Figure 7. Engelmann spruce reproduction top killed by spruce weevil.

CONE AND SEED INSECTS

Approximately 12,000 Douglas-fir and 500 ponderosa pine cones were collected during 1970 and evaluated for insect injury. Douglas-fir cones were collected from 13 locations throughout Montana and Yellowstone National Park. An average of 56 percent of the Douglas-fir cones were visibly deformed due to insect feeding. The most damaging insects on Douglas-fir cones were the western budworm, Choristoneura occidentalis Free., which infested 33 percent of the cones examined; cone and scale midges, Contarinia oregonensis Foote and C. washingtonensis Johnson, which infested 21 percent of the cones; Douglas-fir cone moth, Barbara colfaxiana (Kft), was found in 21 percent of the cones examined; and the fir coneworm, Dioryctria abietivorella (Grote), infested 14 percent of the cones.

An average of 33 percent of the ponderosa pine cones, collected from six locations in Montana, were visibly deformed. The most injurious insect on these cones was a pine seedworm Laspeyresia sp. which infested as many as 97 percent of the cones at one location. Other insects found to be important were cone worms Dioryctria sp. and Dioryctria auranticella (Grote), a midge Contarinia sp., and a cone bug Leptoglossus sp.

MINOR INSECT PROBLEMS

Two species of needle midges, Contarinia pseudotsugae Condr. and C. constricta Condr., caused light damage on Douglas-fir near Kalispell, Montana. These midges cause extensive damage to Christmas tree plantations by mining foliage and causing gall formation on the current year's needles. The variable oak leaf caterpillar, Heterocampa manteo (Dbldy.), caused extensive defoliation of hardwoods on the Fort Totten Indian Reservation and in the Killdeer Mountains, North Dakota. Secondary infestations of the western pine beetle, Dendroctonus brevicomis Lec., occurred in ponderosa pine infested by Ips pini (Say) on the South Fork Clearwater River, Nezperce National Forest, Idaho. A small group kill attributed to D. brevicomis was detected in ponderosa pine on the Lolo National Forest, Montana. A bark beetle, Pityokteines minutus (Swain), killed several hundred subalpine fir in two drainages on the Flathead National Forest. Infestations of a terminal weevil, Pissodes sp., caused top kill of lodgepole pine saplings on the Flathead National Forest and Glacier National Park. A leaf skeletonizer, probably Bucculatrix sp. defoliated approximately 20,000 acres of birch along the Lochsa River in North Idaho. A leaf tier, Anacampsis niveopulvella (Chambers), family Gelechiidae, caused light to moderate defoliation of quaking aspen, Populus tremuloides, in Glacier National Park, Montana, during 1970. Heaviest defoliation occurred at St. Marys Lake, and near Many Glacier.